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SUBSTANTIVE THEMES SELECTED FOR DETAILED CONSIDERATION: PROMOTION OF RAPID AND EFFECTIVE TRANSFER OF TECHNOLOGY IN THE FIELD OF NEW AND RENEWABLE SOURCES OF ENERGY TO DEVELOPING COUNTRIES, INCLUDING THE ROLE OF JOINT VENTURES IN THE FRAMEWORK OF NORTH-SOUTH AND SOUTH-SOUTH COOPERATION, IN FULFILMENT OF THE GOALS AND OBJECTIVES OF THE NAIROBI PROGRAMME OF ACTION, WITH A VIEW TO TAKING DUE ACCOUNT OF THE POTENTIAL CONTRIBUTION OF THOSE SOURCES TO SUSTAINABLE AND ENVIRONMENTALLY SOUND DEVELOPMENT IN ALL COUNTRIES

Promotion of rapid and effective transfer of technology in new and renewable sources of energy to developing countries

Report of the Secretary-General

CONTENTS

		Paragraphs	Page
I.	INTRODUCTION	1 - 5	2
II.	SPECIFIC EXAMPLES	6 - 27	3
III.	CONCLUSIONS	28 - 31	7

* A/AC.218/1992/1.

I. INTRODUCTION

1. In resolution 1 (V), the Committee on the Development and Utilization of New and Renewable Sources of Energy decided to include, for detailed consideration at the sixth session, the theme "Promotion of rapid and effective transfer of technology in the field of new and renewable sources of energy to developing countries, including the role of joint ventures in the framework of North-South and South-South cooperation, in the fulfilment of the goals and objectives of the Nairobi Programme of Action, with a view to taking due account of the potential contribution of those sources to sustainable and environmentally sound development in all countries". The Committee requested the Secretary-General to prepare a report based on an in-depth study of the current stage of achievements in States regarding the theme. 1/ The present report has been prepared in response to that request.

2. In the same resolution, the Committee requested the Secretary-General to prepare a comprehensive and analytical study, to be considered by the Committee at its sixth session, with a view to providing a significant contribution to the United Nations Conference on Environment and Development, through the Preparatory Committee for the Conference, including recommendations for action to promote rapid and effective transfer of technology in the field of new and renewable sources of energy to developing countries. 2/ That report (A/AC.218/1992/5) also addresses some of the issues related to technology transfer. The present report focuses on the activities carried out by Member States, based on information provided by them.

3. The importance of transfer, adaptation and application of mature technologies in the field of new and renewable sources of energy was emphasized in the Nairobi Programme of Action for the Development and Utilization of New and Renewable Sources of Energy. 3/ However, progress to that end has been far short of expectations, and the Committee, in adopting this theme, was in effect expressing increasing concern about the generally slow pace of the implementation of the Nairobi Programme of Action, in particular regarding the transfer of technology to developing countries.

4. The international community has over the years been trying to deal with the general problem of the transfer of technology to developing countries. On the one hand, developing countries in their quest for accelerated development have been insisting on easy access to mature technologies from the developed countries, which, on the other hand, have stressed the need for acceptable returns on investment.

5. Information provided to the Secretariat by relevant authorities and Governments is inadequate to ascertain the extent of technology transfer, including trends, and thereby arrive at definite conclusions and make meaningful recommendations. Member States are therefore urged to provide relevant information to the Committee during its sixth session to enable it to undertake an in-depth consideration of this important subject. A number of specific activities are highlighted below.

II. SPECIFIC EXAMPLES

A. Solar energy

6. The Ministry of Energy and Mineral Resources and the Royal Scientific Society of Jordan are cooperating with Germany to establish performance standards and improve local technology. In Tunisia, a 30 kW demonstration plant was installed in 1987 in cooperation with the United States of America, while Germany assisted in the installation of 110 photovoltaic systems in 90 rural homes and seven schools. An ongoing programme has led to installations of about 97 kW each for providing electricity to 155 rural schools.

7. In the Philippines, many photovoltaic systems have been installed on small islands through German bilateral assistance. Thailand received seed money from Japan for the installation of photovoltaic systems to be used for recharging batteries. Global Photovoltaic Specialists, Inc. of the United States of America has a joint venture programme in China involving training and equity participation for producing photovoltaic modules for export.

8. Gesellschaft für Technische Zusammenarbeit (GTZ) of Germany will supply India with a solar collector test facility to be used for controlling the quality of solar hot water plants and for scientific studies. Testing and quality control are vital for successful transfer. British Petroleum Solar Systems Ltd. of the United Kingdom, has set up joint ventures with local entities to begin photovoltaic production in Thailand and to install a simulator for quality control in India. The guiding objective is to transfer manufacturing know-how and operations to developing countries and thus develop future markets for these products.

9. Ally Capital Corp. (United States) has formed a partnership with a subsidy of AMB-AMRO Holdings, a Dutch bank, Mitni Nevitt of Japan and Hambro, a United Kingdom bank, to offer a variety of investment ventures for small and emerging renewable energy and environmental companies. In the United States, the Agency for International Development has created a private sector energy development project to provide assistance in creating a favourable environment for private ownership, financing and operation of energy facilities in selected developing countries, particularly in the electric power sector. With regard to South-South cooperation, there are joint research programmes between Jordan and Egypt for the utilization of solar energy in remote areas of both countries. Facilities have been installed for equipment testing under local conditions. Cooperation in research has also been ongoing in Latin America in the form of exchanges of students and training. This kind of cooperation gives rise to strong scientific leadership and local capability and know-how - prerequisites for the acquisition and adaptation of foreign technologies.

B. Biomass

10. While some biomass technologies have been fairly widely disseminated throughout the world, notably ethanol production and residue utilization for heat and power, in general, most of the technological possibilities are yet to be realized commercially. In spite of the sizeable number of activities that have been executed within the past decade by various international and donor organizations to adapt and implement biomass technologies in the developing countries, little has been achieved.

11. There are three major United States Department of Energy programmes devoted to the production of biomass fuels and feedstocks: the Short Rotation Woody Programme concentrates on the short rotation intensive culture (SRIC) of woody crops to produce woody feedstocks for biomass conversion; the Herbaceous Energy Crops Programme focuses on the production of energy crops using terrestrial, non-woody plant species; and the Aquatic Species Programme emphasizes research on oil-producing microalgae. To date, only a few operational-size SRIC monoculture hardwood plantations exist, and most have been established within the past three years. The total costs of wood production per unit of land are substantially higher for SRIC than for conventional forests.

12. On the basis of space, insolation and plant nutrients, the potential for biomass production in the oceans is twice that of the land area. Techniques for large-scale harvesting of wild populations as well as methods for cultivation in the hundred thousand to million ton range have been developed and are in operation. Estimates indicate economic feasibility around the year 2000. In industrial countries, densification, a relatively new technology, has been well applied in Europe. However, there is little experience with the transfer of this technology to developing countries.

13. The experience of briquetting in Africa has been mixed. However, densification has been quite successful commercially in countries that lack fossil fuel resources and have abundant biomass resources and in-house machinery manufacturing capability, particularly Brazil and India. In those countries, the total costs for briquette production are in excess of $30 per ton and may be above $35 per ton. Thailand stands out as a country in which briquetting of agricultural wastes has been tried on a large scale, found to be too expensive, and died out, except for providing fuel for a few specialized markets.

14. The use of charcoal briquettes, or biocoal, has been gaining ground recently. The carbonized briquettes are excellent substitutes for wood charcoal. Production of briquettes from sawdust started in Thailand in 1982 and has grown significantly for export. Charcoal briquettes are also produced from coffee husks in Kenya. A recent project to produce briquettes from cotton stalks has been quite successful. The project was unique in that it utilized an agglomeration technology that was more labour-intensive and therefore avoided many of the problems with the briquetting presses.

C. Woodfuel

15. A differentiation has to be made between actions undertaken in the various technology areas. In the case of stoves, which do not require any sophisticated equipment or technology, transfer of knowledge and build-up of national manufacturing capacity has been an important element from the beginning. In the case of gasifiers for power generation, at the other extreme, technology transfer and national manufacturing have only been tried in a few countries. The same is true for other advanced equipment such as wood-fuelled industrial boilers, or high-capacity briquette presses.

16. The use of steam engines for power generation in decentralized systems for rural communities or industrial users has received less attention than it deserves. However, the few cases implemented by the public or private sector have been quite successful in all cases. Nevertheless, there are very few examples of successful technology transfer to developing countries, including manufacturing capacity build-up, except for stoves and a few other low-tech, low-investment technologies, which, owing to the lack of economic incentives or the lack of technical success, have not performed well enough to convince potential investors of their technical feasibility.

17. Cooperation among developing countries has not increased as much as was hoped. There are some cases, such as the Food and Agriculture Organization of the United Nations (FAO) networks in Asia and Latin America, that try to assist countries in the exchange of information and experience, but there is not much in terms of hard-core technology transfer and cooperation. Technology transfer between developed countries has been more successful.

D. Geothermal energy

18. The training of national experts in the various disciplines involved in geothermal energy development and use is an important prerequisite for the effective transfer and adaptation of technology. Currently, there are four international training centres, in Italy, Iceland, New Zealand and Mexico, for education and training of professionals from developing countries in geothermal energy. These training institutes offer courses in all disciplines related to geothermal energy exploration, development and utilization. However, the demand for training far exceeds available facilities.

19. Other initiatives in training and exchange of information have included cooperation agreements between the Department of Energy of the United States of America and the Italian Electric Power Company (ENEL) on the development of geothermal technology, and a joint research programme on reservoir engineering established by Stanford University (United States) and the Instituto de Investigaciones Eléctricas (Mexico). Another important centre for training and research, specializing in reservoir engineering, is the Lawrence Berkeley Laboratory, at the University of California.

20. Technical and financial cooperation have been crucial mechanisms for promoting the rapid transfer of technology to developing countries or among developing countries. The United Nations system has been active in this field, as discussed in the report of the Secretary-General on the progress achieved in the mobilization of financial resources for the implementation of the Nairobi Programme of Action, and inter-agency coordination in the field of new and renewable sources of energy (A/AC.218/1992/7). As indicated in that report, information on bilateral cooperation is incomplete. There are also cooperative arrangements between foreign private investors and national authorities. The large geothermal potential of Indonesia and the Philippines has attracted the interest of foreign private investors, which have facilitated and accelerated the development and exploitation of geothermal resources for electricity generation in those countries. Foreign investors, at present Union Oil of California (UNOCAL) in the Philippines and UNOCAL and Amoco Oil Inc. (AMOSEAS) in Indonesia, have developed geothermal fields under joint operation contracts with the national authorities. The steam produced from those fields is sold to the national power companies (in Indonesia through the national oil company PERTAMINA) at a unit price agreed upon by the parties. The national power companies generate, transmit and sell the electricity.

E. Tar sands and oil-shale

21. The Alberta Oil Sands Technology and Research Authority (AOSTRA) of Canada continues to play an active role in the activities of the United Nations Information Centre for Heavy Crude and Tar Sands. It has acted as host for the Fourth International Conference of Heavy Crude and Tar Sands and was a major participant at the Fifth Conference, held in August 1991. In addition, AOSTRA has signed memorandums of understanding and cooperation with agencies from 15 countries, seven of which are developing countries: Brazil, China, Cuba, Jordan, Trinidad and Tobago, Turkey and Venezuela.

22. AOSTRA is conducting eight joint projects with the Research Institute of Petroleum Exploration and Development of China and, in that connection, research has been conducted in China and Canada and specialists have been exchanged between the two countries. AOSTRA has negotiated further exchange agreements and more joint projects.

23. In Jordan, AOSTRA has provided assistance in the evaluation of oil sand deposits, while in Turkey it has assisted in assessing heavy oil recovery using carbon dioxide. AOSTRA has been cooperating with Venezuela and has signed a memorandum of understanding for cooperation and exchange of technology as well as technical experts in bitumen upgrading, university research and field piloting of new technologies.

24. In Brazil, AOSTRA continues to explore the use of the Taciuk Processor for the processing of Brazilian oil-shale fines and filter coke and has extended those studies to the use of the Processor for the clean-up of refinery sludge. AOSTRA has evaluated oil-shale deposits in Trinidad and

Tobago and the possible application of the AOSTRA Taciuk Processor. It has also been assisting Cuba in evaluating heavy and extra heavy oil resources where Canadian technology may be applied and in introducing advanced drilling technology to Cuba.

25. AOSTRA has a fully operative Technology Transfer and Commercialization Office, providing access to AOSTRA-owned technology and programmes, which are easily obtained by contacting AOSTRA. The AOSTRA Library and Information Services provide information on oil sands, heavy oil and enhanced recovery processes.

26. The Venezuelan national oil company, Petróleos de Venezuela S.A. (PDVSA), and British Petroleum have developed Orimulsion™, a bitumen-in-water emulsion consisting of 70 per cent bitumen, 30 per cent water and a surfactant.

27. A rapid and effective transfer of technology for the development of oil-shale deposits in developing countries is difficult to envisage at this time, primarily owing to the unfavourable economics for its development. Given the long-term prospects of oil-shale development, at the present time, a sector of oil-shale development for which an effective transfer of technology may be called for is in the delineation and evaluation of the deposits.

III. CONCLUSIONS

28. There is considerable scope for transfer of technology in the field of new and renewable sources of energy, and activities in this area have been carried out over the years through bilateral as well as multilateral cooperation. However, the data provided to the Secretariat on these topics are incomplete for an assessment of the general trend and the extent to which the fall of transfer has been affected by the prevailing energy situation in the past years, particularly since the mid-1980s. The current concern about the impact of global warming has led to increased interest in new and renewable sources of energy. It is hoped that such interest will translate into increased transfer and adaptation of mature technologies for the development and use of new and renewable sources of energy.

29. However, issues of technology transfer should not be looked at in isolation. Rather, they should be part of an integrated policy framework that includes, inter alia, education and training of indigenous personnel, increased research and development in the developing countries, adequate financial resources for investment into these and related activities in the developing countries, the establishment of strong institutions to promote new and renewable sources of energy development, local manufacturing capability and markets for such technologies.

30. Intended users should participate actively in the planning, design and implementation of specific projects. Associated with this is the need for more widespread dissemination of information on developments in these areas in both the developed and the developing countries. Socio-cultural factors have

not been adequately addressed. Appreciation of those factors and their incorporation into the planning and design stages would go a long way towards ensuring acceptance of these technologies and hence their successful transfer and widespread use.

31. The involvement of the private sector through direct investment and joint ventures in more specific new and renewable sources of energy will be crucial, as demonstrated by successful examples in geothermal energy in the Philippines and hydropower in many other developing countries.

Notes

1/ Official Records of the General Assembly, Forty-fifth Session, Supplement No. 36 (A/45/36), annex.

2/ Ibid.

3/ Report of the United Nations Conference on New and Renewable Sources of Energy, Nairobi, 10 to 21 August 1981 (United Nations publication, Sales No. E.81.I.24), chap. I, sect. A.